

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1 - 32 (cancelled).

1           33. (new) Chromatography process carried out in a  
2 chromatography column having a column housing defining a  
3 bed space containing a packed bed of particulate  
4 chromatography medium, the process comprising passing a  
5 process liquid containing components to be separated  
6 through the packed bed in said column to separate the  
7 components chromatographically,  
8           characterised by detecting the presence and/or  
9 position of at least one of said components in the packed  
10 bed in said column by means of transmitting ultrasound  
11 signals through the bed space and detecting the  
12 transmitted signals, the speed and/or attenuation of the  
13 signals being affected by the presence of said at least  
14 one component in the bed on the path of a said ultrasound  
15 transmission.

1           34. (new) Chromatography process according to claim  
2 33 in which the detected said at least one component  
3 elutes through the bed as a band.

1           35. (new) Chromatography process according to claim  
2 34 in which ultrasound transmissions are made at plural  
3 locations distributed along the packed bed, to track the  
4 progress of said component band as it passes through the  
5 bed.

1           36. (new) Chromatography process according to claim  
2 34 in which the movement of said component band is  
3 visualized on a display outside the column.

1           37. (new) Chromatography process according to claim  
2 33 in which the process liquid contains an impurity  
3 component which binds to the medium in the bed adjacent  
4 an inlet for the process liquid, and in which ultrasound  
5 transmissions made through the packed bed adjacent said  
6 inlet are used to determine the extent of encroachment of  
7 bound impurity into the bed from the inlet end.

1           38. (new) Process according to claim 33 in which  
2 plural ultrasound transmitters and/or plural ultrasound  
3 detectors therefor are distributed along the column to  
4 make ultrasound transmissions along a plurality of paths  
5 distributed along the packed bed.

1           39. (new) Process according to claim 33 in which  
2 the column housing wall is opaque.

1           40. (new) Process according to claim 33 in which  
2 the time of flight or speed of transmission of the  
3 ultrasound signals is monitored.

1           41. (new) Process according claim 33 in which the  
2 attenuation of the ultrasound transmissions is monitored.

1           42. (new) Process according to claim 33 in which  
2 the column housing is a vertical cylinder and the  
3 ultrasound transmissions are made diametrically across  
4 the cylinder.

1           43. (new) Process in which a particulate medium is  
2 packed into an internal bed space of a column housing of  
3 chromatography apparatus to form a bed of said medium in  
4 the bed space, characterized by transmitting ultrasound  
5 signals from outside the column housing, through the  
6 column housing wall and through the packed bed, and  
7 detecting the ultrasound signals at the outside of the  
8 column wall, measuring the time of flight or speed of the  
9 transmissions and/or the attenuation of the transmitted  
10 signals, and determining from that measurement a packing  
11 density or degree of compression of the packed medium.

1           44. (new) Process according to claim 43 in which  
2 plural ultrasound transmitters and/or plural ultrasound  
3 detectors therefor are distributed along the column to  
4 make ultrasound transmissions along a plurality of paths  
5 distributed along the packed bed.

1           45. (new) Process according to claim 43 in which  
2 the column housing wall is opaque.

1           46. (new) Process according to claim 43 in which  
2 the time of flight or speed of transmission of the  
3 ultrasound signals is monitored.

1           47. (new) Process according claim 43 in which the  
2 attenuation of the ultrasound transmissions is monitored.

1           48. (new) Process according to claim 43 in which  
2 the column housing is a vertical cylinder and the  
3 ultrasound transmissions are made diametrically across  
4 the cylinder.

1           49. (new) Chromatography process comprising a  
2 packing step in which a particulate medium is packed into  
3 a bed space of a chromatography column housing to form a  
4 close-packed bed entirely filling the bed space, and a  
5 chromatography step in which a process liquid containing  
6 components to be separated is passed through the packed  
7 bed to separate the components,

8            wherein in the packing step the particulate medium  
9            is packed into the bed space by pumping a slurry thereof  
10           into the bed space through a port in the wall of the  
11           column housing, causing packed bed to accumulate in an  
12           accumulation direction,

13           characterized by transmitting ultrasound signals  
14           through the bed space as the front of the accumulating  
15           bed advances in the accumulation direction during  
16           packing, detecting the transmitted signals to monitor the  
17           advance of the bed front, and controlling one or both of  
18           slurry packing rate and particulate medium concentration  
19           in the slurry in dependence on the monitored rate of  
20           advance.

1           50. (new) Chromatography process according to claim  
2           49 comprising monitoring the speed of transmission of the  
3           ultrasound signals through the bed space.

1           51. (new) Chromatography process according to claim  
2           49 comprising monitoring the amplitude of the transmitted  
3           signals.

1           52. (new) Chromatography process according to claim  
2           49 in which the detected ultrasound signals are  
3           transmitted transversely to the accumulation direction of  
4           the packed bed of medium.

1           53. (new) Chromatography process according to claim  
2   49 in which the detected ultrasound signals are  
3   transmitted through the bed space at plural locations  
4   distributed along the accumulation direction of the  
5   packed bed of medium.

1           54. (new) Chromatography process according to claim  
2   53 in which a real-time rate of advance of the front of  
3   the accumulating bed, determined from its detected  
4   passage past said plural locations as mentioned, is  
5   compared with a predetermined target rate of advance  
6   value and the packing pump pressure and/or slurry  
7   concentration adjusted as necessary.

1           55. (new) Chromatography process according to claim  
2   53 in which respective real-time rates of advance are  
3   determined for a plurality of said locations and compared  
4   with respective target values constituting a  
5   predetermined packing profile, and feedback control  
6   signals are sent to a packing pump in dependence on the  
7   comparisons.

1           56. (new) Chromatography process according to claim  
2   55 in which said predetermined packing profile prescribes  
3   an initial phase with a slower rate of advance than in a  
4   subsequent main phase.

1           57. (new) Chromatography process according to claim  
2   49 in which a control processor, operatively connected to  
3   the packing pump and ultrasound detection arrangement, is  
4   loaded with target packing data from a discrete data  
5   carrier, and controls the packing pump in dependence on  
6   comparisons between the detected and target data.

1           58. (new) Chromatography process according to claim  
2   49 in which a detected ultrasound transmission adjacent  
3   that end of the bed space filled last by the accumulating  
4   bed is used to detect the arrival of the advancing bed  
5   front and thereby initiate reduction or cessation of pump  
6   operation at the end of the packing procedure.

1           59. (new) Chromatography process according to claim  
2   49 in which a control processor is programmed to respond  
3   to a detected dip in packing pressure, corresponding to  
4   the bed space becoming full of medium, by turning off the  
5   packing pump.

1           60. (new) Chromatography process according to claim  
2   49, further comprising making ultrasound transmissions  
3   through the bed space during the chromatography step, to  
4   detect the presence and/or position of a said component  
5   in or passing through the packed bed.

1           61. (new) Chromatography process according to claim  
2   60 in which detected ultrasound transmissions at plural  
3   locations along the packed bed are used to track the  
4   progress of a band of a said component passing through  
5   the bed.

1           62. (new) Chromatography process according to claim  
2   49 in which a detected ultrasound transmission through  
3   the packed bed adjacent an input port for the process  
4   liquid is used to determine the extent of encroachment of  
5   bound impurity into the bed from the input end.

1           63. (new) Process according to claim 33 in which  
2   the ultrasound signals are transmitted through the wall  
3   of the column housing into the packed bed, and also  
4   detected at the outside of said wall.

1           64. (new) Process according to claim 34 in which  
2   the ultrasound signals are transmitted through the wall  
3   of the column housing into the packed bed, and also  
4   detected at the outside of said wall.

1           65. (new) Process according to claim 35 in which  
2   the ultrasound signals are transmitted through the wall  
3   of the column housing into the packed bed, and also  
4   detected at the outside of said wall.



1           66. (new) Process according to claim 36 in which  
2 the ultrasound signals are transmitted through the wall  
3 of the column housing into the packed bed, and also  
4 detected at the outside of said wall.